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ORIGINAL ARTICLE

Clinical and economic benefits of integrated pump/CGM technology therapy in patients with type 1 diabetes in Colombia☆

Ana Maria Gomez[a,*], Rafael Alfonso-Cristancho[b,c], John Jairo Orozco[d], Peter Matthew Lynch[e], Diana Prieto[b], Rhodri Saunders[f], Stephane Roze[g], Juan Esteban Valencia[h]

[a] *Hospital Universitario de San Ignacio – Universidad Javeriana, Bogotá, Colombia*
[b] *University of Washington, Seattle, WA, USA*
[c] *RANDOM Foundation, Bogotá, Colombia*
[d] *Medtronic PLC Andean Region, Bogotá, Colombia*
[e] *Medtronic Diabetes Inc., Northridge, CA, USA*
[f] *Ossian Health Economics and Communications, Basilea, Switzerland*
[g] *HEVA HEOR, Lyon, France*
[h] *Medtronic Latinamerica Inc., Miami, FL, USA*

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KEYWORDS
Type 1 diabetes;
Insulin infusion systems;
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Cost-effectiveness analysis;
Decision modeling

Abstract
Objective: To assess the long-term clinical and economic impact of integrated pump/CGM technology therapy as compared to multiple daily injections (MDI), for the treatment of type 1 diabetes (T1D) in Colombia.
Methods: The CORE Diabetes Model was used to simulate a hypothetical cohort of patients with T1D. Mean baseline characteristics were taken from a clinical study conducted in Colombia and a healthcare payer perspective was adopted, with a 5% annual discount rate applied to both costs and outcomes.
Results: The integrated pump/CGM improved mean life expectancy by 3.51 years compared with MDI. A similar increase occurred in mean quality-adjusted life expectancy with an additional 3.81 quality-adjusted life years (QALYs). Onset of diabetes-related complications was also delayed as compared to MDI, and mean survival time free of complication increased by

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* Corresponding author.
E-mail address: amgomezm5@gmail.com (A.M. Gomez).

1.74 years with integrated pump/CGM. Although this increased treatment costs of diabetes as compared to MDI, savings were achieved thanks to reduced expenditure on diabetes-related complications. The estimated incremental cost-effectiveness ratio (ICER) for SAP was Colombian Pesos (COP) 44,893,950 (approximately USD$23,200) per QALY gained.
Conclusions: Improved blood glucose control associated to integrated pump/CGM results in a decreased incidence of diabetes-related complications and improves life expectancy as compared to MDI. Using recommended thresholds from the World Health Organization and previous coverage decisions about health technologies in Colombia, it is a cost-effective alternative to MDI for the treatment of type 1 diabetes in Colombia.

PALABRAS CLAVE
Diabetes tipo 1;
Sistemas de infusión de insulina;
Monitorización continua de glucosa;
Análisis de coste-efectividad;
Modelamiento de decisiones

Beneficios clínicos y económicos de la terapia con bomba de insulina integrada a sistema de monitoreo continuo de glucosa en los pacientes diabéticos tipo 1 en Colombia

Resumen
Objetivo: Evaluar los impactos clínicos y económicos de largo plazo de la terapia con bomba de insulina integrada a sistema de monitorización continua de glucosa (MCG) vs. inyecciones múltiples diarias de insulina (MDI) en pacientes con diabetes tipo 1 (DT1) en Colombia.
Métodos: Se usó el CORE Diabetes Model con el fin de simular una cohorte hipotética de pacientes con DT1. Las características promedio de línea base fueron tomadas de un estudio clínico local. La perspectiva fue desde del pagador y se aplicó una tasa de descuento del 5% para los costes y los resultados.
Resultados: La bomba de insulina integrada al sistema de MCG mejoró la expectativa de vida media en 3,51 años y 3,81 años de vida ajustados por calidad adicionales. En comparación con MDI hubo un retraso en el inicio de complicaciones relacionadas con la DT1, y el tiempo promedio de sobrevida y libre de cualquier complicación se aumentó en 1,74 años. Los costes relacionados con la bomba de insulina integrada al sistema de MCG fueron compensados con los ahorros por la disminución en las complicaciones relacionadas con la DT1. La relación de coste efectividad incremental fue de 23.200 dólares americanos por años de vida ajustados por calidad.
Conclusiones: El mejor control glucémico asociado con bomba de insulina integrada al sistema de MCG conduce a una disminución en la incidencia de las complicaciones relacionadas con DT1 y aumenta la esperanza de vida cuando se compara con MDI. De acuerdo a los umbrales recomendados por la Organización Mundial de la Salud, esta es una estrategia coste-efectiva cuando se compara con MDI en el tratamiento de la DT1.

Introduction

Diabetes mellitus (DM) is a significant health problem in Colombia and a growing challenge for its health system. DM prevalence is 9.6% (8.6–10.7%) in the population aged 20–79 years, and it is estimated that one out of 1000 children (0–14 years) has type 1 diabetes mellitus (T1DM).[1] In addition, Aschner and Aguilar reported an 8.0% prevalence of DM in South and Central America, and children with T1DM account for 0.2% of the total population with DM.[2] In Colombia, Aschner found a prevalence ranging from 4% to 8% depending on the age range of the study population, and estimated at 0.07% the prevalence of T1DM in children under 15 years of age.[3]

Barcelo et al. estimated the total economic costs of T1DM and type 2 diabetes mellitus (T2DM) to be US$ 2.5 billion for 2003. This was a relatively low amount as compared to other Latin American countries.[4] Barcelo et al., in *The cost of diabetes in Latin America and the Caribbean. Bulletin of the World Health Organization. 2003*, attributed this low economic burden of the disease to the low frequency of the use of outpatient clinics (0.7%) and hospitalization services (6.1%) by the Colombian population.[4]

T1DM is associated with an increased risk of severe complications, and associated cardiovascular disease is the attributable cause of death in 47% of men and 41% of women with T1DM.[5] Beyond the clinical impact, complications related to T1DM have significant implications for patient quality of life (QoL). Solli et al. evaluated the results of the EuroQol 5-Dimensions (EQ-5D) questionnaire, which allows for assessing the quality of life of a given state of health between 0 and 1, where 0 represents death and 1 a full